ECE 5256 Project 2

Intensity Transformations

You can use any image for the following for the parts 1 and 2, but the project works best if the images are of poor contrast (too dark, too bright, mostly gray…)

1. Image Enhancement Using Intensity Transformations

The focus here is to experiment with intensity transformations to enhance an image. Download an image and enhance it using the transformation, $s = cr^v$

There are two parameters, *c* and *r* for which values have to be selected. As in most enhancement tasks, experimentation is a must. The objective of this project is to obtain the best visual enhancement possible. Once (according to your judgment) you have the best visual result, and explain the reasons for your choice.

2. Histogram Equalization

Implement the histogram equalization technique, but do not using the *histeq* command.

a) Display an image
b) plot of its histogram
c) plot of the histogram-equalization transformation function (CDF of original image)
d) plot the histogram-equalized image
e) plot the histogram-equalized image histogram

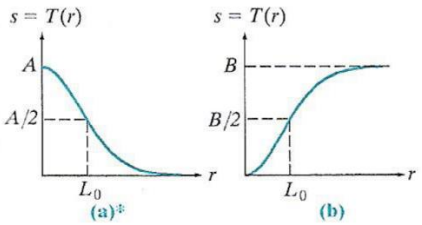
3 Spatial filtering

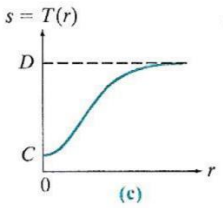
(a) Add noise to an image whose maximum intensity is close to 255 on a scale of 0-255 using 10*randn (standard deviation of 10, mean of 0).
(b) Use a Sobel edge detector to display the edges in an image.
(c) Low-pass filter the original image before detecting edges using a two different filters in an attempt to obtain smooth edges.

4. Problems

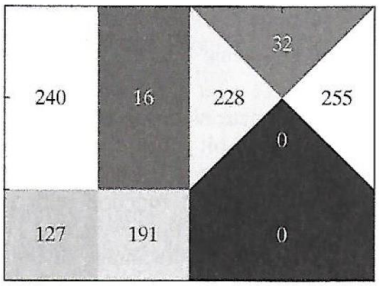
Please do the following problems from the text:
3.2 (b), (c), 3.7

3.2 Exponentials of the form $e^{-\alpha r^2}$ with α a positive constant, are useful for constructing smooth intensity transformation functions. Start with this basic function and construct transformation functions having the general shapes shown in the following three figures. The constants shown are input parameters, and must be included in your answer.





3.7 Obtain the unnormalized *and* the normalized histograms of the following 8-bit, $M \times N$ image. Give your histogram either in a table or a graph, labeling clearly the value and location of each histogram component in terms of M and N. Double-check your answer by making sure that the histogram components add to the correct value.



Turn in:

1 Project title, course number, date due
2 Brief description of what you have done
3 Explanation and/or discussion of results
4 Appendix: program listing